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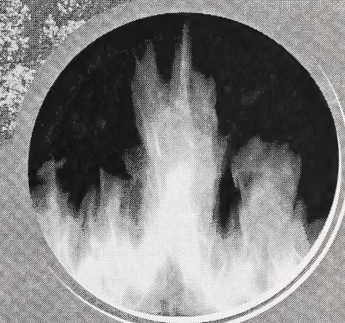
SCIENCE 9

Module

2

Matter and Chemical Change

*Home Instructor's Guide
and Assignment Booklet 2A*



Learning
Technologies
Branch

Alberta
LEARNING

Science 9

Module 2: Matter and Chemical Change

Home Instructor's Guide and Assignment Booklet 2A

Learning Technologies Branch

ISBN 0-7741-2576-4

Cover Art: middle right: Corbis

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The Learning Technologies Branch acknowledges with appreciation the Alberta Distance Learning Centre and Pembina Hills Regional Division No. 7 for their review of this Home Instructor's Guide and Assignment Booklet.

This document is intended for	
Students	✓
Teachers	✓
Administrators	
Home Instructors	✓
General Public	
Other	



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- Alberta Learning, <http://www.learning.gov.ab.ca>
- Learning Technologies Branch, <http://www.learning.gov.ab.ca/ltb>
- Learning Resources Centre, <http://www.lrc.learning.gov.ab.ca>

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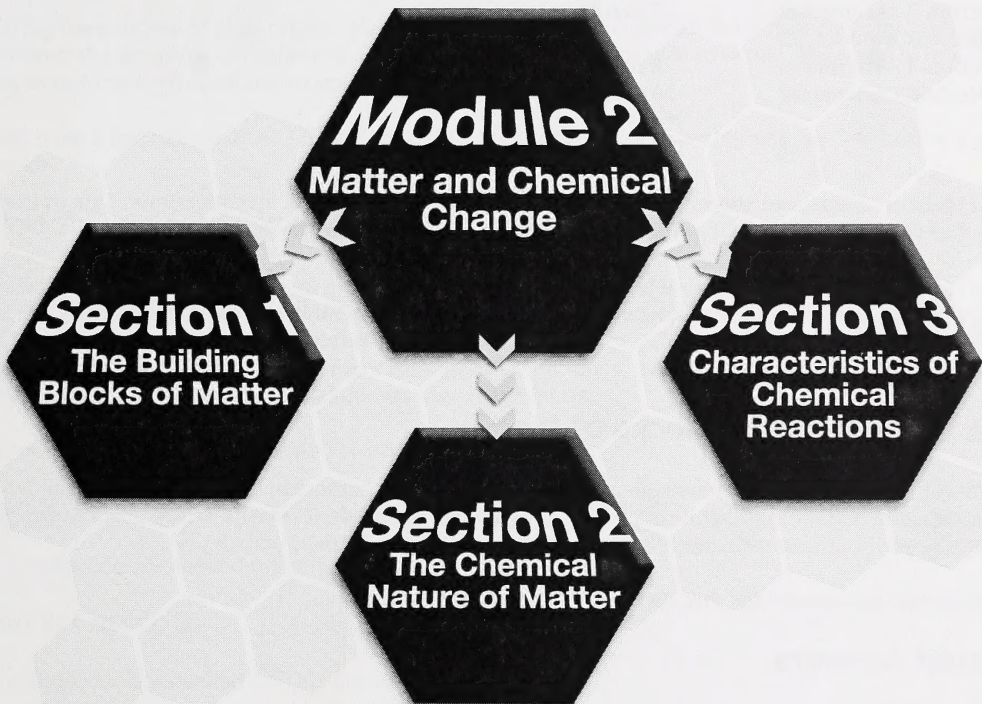
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THIS COURSEWARE IS NOT SUBJECT TO THE TERMS OF A LICENCE FROM A COLLECTIVE OR LICENSING BODY.

Module 2: Matter and Chemical Change

The major emphasis of this module is Nature of Science.

In this module the student investigates materials and describes them in terms of their properties. The student learns to investigate materials in a safe manner. Using knowledge and theories already developed, the student identifies and interprets patterns in the reactions between substances. Also, the student uses a system of symbols and names to refer to substances and reactions.



Assessment

The student's successful completion of all assignments in the Assignment Booklets will depend on practice obtained while doing the various activities and readings. Many choices of activities have been provided so that students have some control over their own learning.

The following distribution of marks is suggested in determining the student's grade for this module.

Assignment Booklet 2A	
Section 1 Assignment	41 marks
Section 2 Assignment	37 marks
Assignment Booklet 2B	
Section 3 Assignment	22 marks
Final Module Assignment	50 marks
<hr/>	
TOTAL	150 marks

Note that a teacher-supervised school laboratory is recommended for some investigations. Talk to the course teacher about the availability of a teacher-supervised school laboratory.



Students should have safety goggles and latex gloves for all investigations involving the manipulation of materials. Have students pay attention to all safety icons.

Section 1: The Building Blocks of Matter

In this section the student gains knowledge about the makeup of substances. This knowledge is gained through hands-on investigations. While exploring substances, the student revisits safety procedures. Also, the student learns about scientific models and theories about the nature of matter.

No extra materials are needed for this section.

Suggested Answers

Section 1: Lesson 4

Textbook questions 1 to 5 and 11 of “Wrap-up: Topics 1 to 3,” page 115:

1. (a) At least one of the parts making up a heterogeneous mixture is visible. None of the parts making up a homogeneous mixture are visible.
(b) In a physical change a new substance(s) is not formed. In a chemical change a new substance(s) is formed.
(c) Mass does not change during a chemical reaction in the first law, while compounds are pure substances with fixed proportions in the second law noted.
(d) In an element, there's only one type of atom. With a compound, two or more types of atoms are chemically bonded to create a new, pure substance.
(e) An observation is something actually seen or measured, while a theory is a possible explanation of observations backed by experimental evidence.

2. (a) combustibility
(c) mechanical mixture
(e) density

- (b) solution
(d) element

3. WHMIS is the acronym for Workplace Hazardous Materials Information System. This system provides nation-wide safety standards (labelling, guidelines) for working with hazardous materials.
4. Answers will vary. Examples of chemical changes include combustion (burning), baking a cake, digesting food, cellular respiration, photosynthesis, and bleaching stains. Physical changes include cutting grass, steeping tea (dissolving), shaping modeling clay, and heating a stove element.
5. During the process of electrolysis, electrical energy is used to break the bonds (energy is absorbed) between the atoms of a compound. For example, in the electrolysis of water, electrolysis releases the atoms to form hydrogen and oxygen gases.
11. Heat from a fire can melt the bismuth and turn the sprinkler on to extinguish the fire before it spreads too far.

Section 2: The Chemical Nature of Matter

This section focuses more closely on elements. Elements are studied individually and as building blocks of matter. The student is given opportunities to discover patterns in the properties of elements. This leads the student to identify families of elements with properties in common. The student relates the properties of elements to atomic structures. The student describes compounds as chemical combinations of elements. Also, the student writes symbols for elements and compounds.

The following materials will be needed to complete this section.

Section 2: Lesson 1

No extra materials are needed for this lesson.

Section 2: Lesson 2

No extra materials are needed for this lesson.

Section 2: Lesson 3

- marshmallows
- toothpicks

Section 2: Lesson 4

No extra materials are needed for this lesson.

Suggested Answers

Section 2: Lesson 4

Textbook questions 1, 2, 3, 7, 8, and 10 of “Wrap-up: Topics 4 to 6,” page 145:

1. Check that the word pairs are the following:
 - halogen—chlorine
 - alkali metal—sodium
 - atomic number—number of protons
 - noble gas—argon
 - alkaline earth metal—beryllium
 - diatomic molecule—hydrogen
2. Highly corrosive elements include fluorine, chlorine, bromine, iodine, and astatine.
3. Highly reactive metals include the following:

• lithium	• potassium	• cesium
• sodium	• rubidium	• francium
7. The *periodic* table is a collection of elements. Vertical columns in the table are called *groups*. Horizontal rows in the table are called *periods*.
8. Hydrogen peroxide, carbon tetrachloride, and nitrogen dioxide are molecular, while aluminum oxide is ionic.
10. The ions carry the current through the solution. The more ions there are in a solution, the better the solution conducts electricity. Ionic compounds break into negative and positive ions when they dissolve in water. Molecular compounds do not break up when they dissolve.

ASSIGNMENT BOOKLET 2A

Science 9

Module 2: Section 1 Assignment and Section 2 Assignment

Home Instructor's and Student's Comments:

STUDENT FILE NUMBER

(if label is missing or incorrect)

Date Submitted:

Apply Module Label Here

Name

Address

Postal Code

*Please verify that preprinted label is for
correct course and module.*

FOR SCHOOL USE ONLY

Assigned Teacher:

Date Assignment Received:

Grading:

Teacher's Comments

Teacher's Signature

Home Instructor: Keep this sheet when it is returned to you as a record of the student's progress.

INSTRUCTIONS FOR SUBMITTING THIS DISTANCE LEARNING ASSIGNMENT BOOKLET

When you are registered for distance learning courses, you are expected to regularly submit completed assignments for correction. Try to submit each Assignment Booklet as soon as you complete it. Do not submit more than one Assignment Booklet in one subject at the same time. Before submitting your Assignment Booklet, please check the following:

- Are all the assignments completed? If not, explain why.
- Has your work been reread to ensure accuracy in spelling and details?
- Is the booklet cover filled out and the correct module label attached?

MAILING

1. Do **not** enclose letters with your Assignment Booklets. **Send all letters in a separate envelope.**
2. Put your Assignment Booklet in an envelope and take it to the post office and have it weighed. Attach **sufficient postage** and seal the envelope.

FAXING

1. Assignment Booklets may be faxed to the school with which you are registered. Contact your teacher for the appropriate fax number.
2. All faxing costs are the responsibility of the sender.

E-MAILING

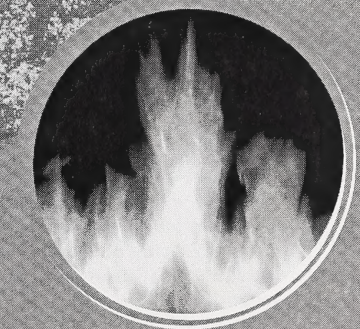
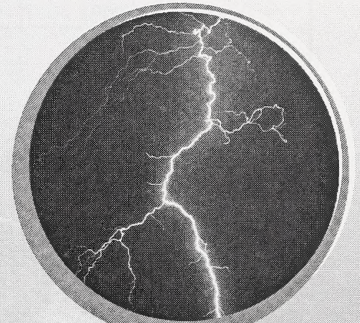
It may be possible to e-mail your completed Assignment Booklet to the school with which you are registered. Contact your teacher for the appropriate e-mail address.

SCIENCE 9

Module

2

Matter and Chemical Change *Assignment Booklet 2A*



Learning
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FOR TEACHER'S USE ONLY

Summary

	Total Possible Marks	Your Mark
Section 1 Assignment	41	
Section 2 Assignment	37	
	78	

Teacher's Comments

Science 9
Module 2: Matter and Chemical Change
Assignment Booklet 2A
Section 1 Assignment and Section 2 Assignment
Learning Technologies Branch

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ASSIGNMENT BOOKLET 2A
SCIENCE 9: MODULE 2
SECTION 1 ASSIGNMENT AND SECTION 2 ASSIGNMENT

Your mark for this module will be determined by how well you do your assignments.

This Assignment Booklet is worth 78 marks out of the total 150 marks for the assignments in Module 2. The value of each assignment and each question is stated in the left margin.

Work slowly and carefully. If you have difficulty, go back and review the appropriate topic.

Be sure to proofread your answers carefully.

Section 1 Assignment: The Building Blocks of Matter

Read all parts of your assignment carefully and record your answers in the appropriate places.

1. A message can be communicated by simple graphics called icons. These icons can signal a message in an immediate fashion. This makes icons very useful in communicating a safety issue. An icon is most effective when its form relates to its meaning.

Indicate which safety rule is likely represented by each of the following icons. Explain.

- a. The following icon was placed on a package of mothballs.

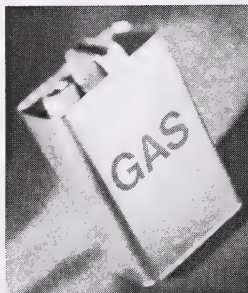


2

- b. The following icon is on a set of compasses. The compasses are to be used to make circle graphs.



2. Refer to the following photograph.



2

- a. What two WHMIS symbols should be placed on this can of gasoline?

2

- b. What two textbook safety symbols could be put on this can of gasoline?

3. Classify the following mixtures as a solution, a heterogeneous mixture, or a suspension.

1

- a. muddy water _____

1

- b. whipping cream _____

1

- c. brass (an alloy of zinc and copper) _____

1

- d. alcohol and water _____

4. Classify the following observed changes as physical or chemical. Provide at least two clues that you used to identify the change. Be specific.

2

- a. You tear a sheet of paper into small chunks.

2

- b. You watch as the clear, runny egg white turns to a white solid in the hot frying pan.

2

- c. "Steam" comes out of the electric kettle spout.

1

5. a. List one physical property that would allow you to tell the difference between gasoline and water.

1

- b. List one chemical property that would allow you to tell the difference between gasoline and water.

Return to page 24 of the Student Module Booklet and continue with Lesson 3.

4

6. Match the following descriptions with the appropriate person or group. Fill in the answer blanks to the left of the descriptions. Note that there are more answers than descriptions.

- | | | |
|----------|---|--|
| _____ a. | He (they) recognized that elements could be combined to form compounds. | A. scientists inspired by Antoine Lavoisier |
| _____ b. | He (they) developed procedures such as distillation and also described properties. | B. Antoine Lavoisier |
| _____ c. | Precise measurements of mass led to the law of conservation of mass. | C. Robert Boyle |
| _____ d. | Scientific knowledge should be built on experimental evidence rather than on thought. | D. Greek philosophers |
| | | E. Sir Francis Bacon |
| | | F. Dmitri Mendeleev |
| | | G. alchemists |
| | | H. seventeenth and eighteenth century scientists |

8

7. Complete the following table. The terms *light* and *heavy* actually refer to weight. Choose terms more appropriate to mass than *light* and *heavy* for your answers in the “mass” row.

Subatomic Particle Summary			
Characteristic	Electron	Proton	Neutron
charge			
mass		massive (compared to an electron)	
location			

3

8. While watching the glowing embers of a campfire fade, Fran observed “The mass of ashes left after a fire is much less than the mass of the wood you burned.” Does Fran’s observation contradict the law of conservation of mass? Explain.

- ① 9. “If it doesn’t have exactly one hydrogen atom and two oxygen atoms it is **not** water.” This statement agrees with the law of _____.
- ② 10. A student jumped into a swimming pool. She described the water in two ways. Identify each of the following statements as either an observation or an inference.
- a. The water is very cold. _____
- b. The water has lost energy. _____
11. Identify the following atomic models.
- ① a. This was the first model to show that most of the atom was empty space.

- ① b. Electrons are more likely to be closer to, rather than farther from, the nucleus.

- ① c. Electrons are stuck in a positively charged mass.

 Return to page 33 of the Student Module Booklet and continue with Section 2.

37

Section 2: The Chemical Nature of Matter

Read all parts of your assignment carefully and record your answers in the appropriate places.

1

1. In the book titled *Uncle Tungsten*, Oliver Sacks described childhood memories of a certain group of substances.

“... these seemed to exert a power on me from the start. They stood out, conspicuous against the heterogeneousness of the world, by their shining, gleaming quality, their silveriness, their smoothness and weight. They seemed cool to the touch, and they rang when they were struck.”

Circle the letter of the best response.

Based on your knowledge of chemical properties, what group of substances was the author likely describing?

- A. halogens
- B. metals
- C. non-metals
- D. solutions

2. Identify the following substances as metal, non-metal, or metalloid.

1

a. solid, shiny, conducts heat, brittle _____

1

b. solid, dull, does not conduct electricity, not ductile _____

Return to page 39 of the Student Module Booklet and continue with Lesson 2.

1

3. Which non-synthetic element has the largest atomic mass?

1

4. How many protons does the nucleus of calcium contain?

1

5. Any atom that has 47 protons in its nucleus is an atom of _____.

1

6. Which period contains nickel?

- ① 7. List the elements that are liquid at room temperature.
- _____
- ② 8. Calculate the number of neutrons in manganese with a mass number of 24. Show your work.

Return to page 43 of the Student Module Booklet and continue with Lesson 3.

- ① 9. a. Suppose a substance is dissolved in water. The solution conducts electricity. The substance dissolved is a/an _____ compound.
- ① b. Water and carbon dioxide are examples of _____ compounds.
- ① c. The chemical name for the solid MgO is _____.
- ③ 10. Write the name for each of the following ionic compounds.
- a. NaF _____
- b. LiCl _____
- c. ZnS _____
11. The noble gases and the alkali metals are in different columns of the periodic table.
- ② a. List two ways in which the noble gases are like the alkali metals.
- _____
- _____
- ④ b. List two ways in which the noble gases are different from the alkali metals.
- _____
- _____
- _____
- _____

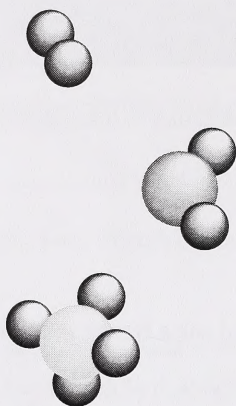
2

12. Complete the data table.

Element	Symbol	Atomic Number	Atomic Mass
lithium			
sulfur			

6

13. Refer to "Figure 2.42" on page 138 of the textbook. "Figure 2.42" shows the following models of molecules along the left outer edge. Identify these models in the textbook.



Complete the table for these three molecules. Classify each molecule as a binary compound or a diatomic molecule. Record your answers in the following table.

Naming Molecules			
Location (within "Figure 2.42," page 138 of textbook)	Chemical Formula	Chemical Name	Type of Substance (a compound or diatomic molecule)
top left-hand			
middle left-hand	H ₂ O		compound
bottom left-hand		methane	

3

14. Match the following chemical names on the left with their formulas on the right. Fill in the answer blanks to the left of the chemical names. Note that there are more formulas than chemical names.

_____ a. iron (II) chloride

A. K_2O

_____ b. potassium oxide

B. $ZnSO_4$

_____ c. zinc sulfate

C. P_4O_6

D. $FeCl_2$

2

15. Write the definite fixed ratios for the following chemicals.

a. glucose ($C_6H_{12}O_6$) _____

b. baking soda ($NaHCO_3$) _____

2

16. Refer to the molecular models shown in “Figures 2.64 A and B” on page 162 of the textbook. Draw a similar model of carbon tetrachloride, and write down its formula.



Submit your completed Assignment Booklet 2A to your teacher for assessment.
Then return to page 55 of the Student Module Booklet and begin Section 3.

ASSIGNMENT BOOKLET DECLARATIONS

The school you are registered with may require you to submit this signed form with your Assignment Booklet.

The Student's Declaration is to be signed by the student. If the student is under 16, the Supervisor's Declaration may need to be signed by the supervisor, who is usually a home instructor, teacher, or home-schooling coordinator. Failure to complete this page may invalidate the assignment results. Please contact your school and ask if this completed form is required.

STUDENT'S DECLARATION

- I have followed the instructions outlined in the Student Module Booklet.
- I have completed the activities to prepare myself for the assignments in this Assignment Booklet.
- I completed the assignments in this Assignment Booklet by myself.

Student's Signature

SUPERVISOR'S DECLARATION

I hereby certify that I have supervised the learning activities completed by _____.
Student's Name

I also certify that to the best of my knowledge the assignments in this Assignment Booklet were completed independently by this student.

Supervisor's Signature

If you, the student or supervisor, have any comments or observations regarding this module, write them in the following space.
